We Claim:

1. A method of producing a nanocolumnar airbridge structure comprising the steps of:

forming a layer of at least one dielectric on a surface of a substrate;

forming a set of line trenches, having a trench bottom surface in said dielectric layer, the closest ones of said line trenches being separated by a ground rule distance;

transferring a nanometer-scale pattern into the dielectric containing said line trenches;

depositing a bridge layer over the surface of said dielectric layer to form a mechanical link between adjacent lines;

forming a set of vias within said line trenches extending through said dielectric layer;

depositing said vias and line trenches with a liner layer;

filling said vias and line trenches with a conductive fill metal to form a set of metal lines;

planarizing said metal lines and said liner layers by polishing so that the metal is coplanar with the top of said bridge layer; and

capping said metal lines with an electromigration and/or diffusion barrier to produce said nanocolumnar airbridge structure.

2. A method according to claim 1, wherein said step of nanometer scale patterning is accomplished by forming an array of fine holes having diameters less than said ground rule distance in said dielectric layer.

3. A method according to claim 1, wherein said dielectric layer is one of: spin-on organosilicate film, CVD organosilicate film, silicon dioxide, fluorinated silicon dioxide, a fluorinated glass deposited from a fluorinated silane, adhesion promoter, polish stop, etch stop, organic

dielectric, porous versions of any of the preceding materials, or any combinations thereof.

4. A method according to claim 1, wherein said step of nanometer scale patterning is accomplished using phase-separated polymers.

5. A method according to claim 1, wherein said step of nanometer scale patterning is accomplished using diblock copolymers.

6. A method according to claim 1, wherein said step of nanometer scale patterning is accomplished using one of the following lithographic techniques: photolithography, electron beam lithography, x-ray lithography, interferometric lithography, extreme-ultra violet lithography, imprint lithography, soft lithography, photo-imprint lithography, thermal imprint lithography, embossing, and any combinations thereof.

7. A method according to claim 1, wherein said step of transferring said nanometer scale pattern results in a dielectric having a nanometer scale hole or pillar pattern only between the trough lines.

8. A method according to claim 1, wherein said step of transferring said nanometer scale pattern results in the dielectric having a nanometer scale holes or pillars between the trough lines and under the trough lines.

9. A method according to claim 1, wherein said step of depositing said bridge layer on the nanometer scale patterned dielectric results in the formation of nanometer scale capped voids.

10. A method according to claim 1, wherein said bridge layer comprises a dielectric material.

11. A method according to claim 10, wherein said bridge layer is a multilayered structure comprising several dielectric materials.

12. A method according to claim 1, wherein said bridge layer is a dielectric film having a dielectric constant less than 3.5.

13. A nanocolumnar airbridge structure comprising:

a substrate;

at least one dielectric layer on a surface of said substrate;

a set of line trenches having a trench bottom surface in said dielectric layer, the closest ones of said line trenches being separated by a ground rule distance;

a nanometer-scale pattern transferred into the dielectric containing said line trenches;

a bridge layer deposited over the surface of said dielectric layer to form a mechanical link between adjacent lines;

a set of vias formed within said line trenches extending through said dielectric layer, said vias and said line trenches being lined with a liner layer and filled with a conductive fill metal to form a set of metal lines, wherein said metal lines and said liner layers are polished so that the metal is coplanar with the top of said bridge layer; and

an electromigration and/or diffusion barrier for capping the top surfaces of said metal lines.

14. The nanocolumnar airbridge structure according to claim 13, wherein said nanometer scale pattern is an array of fine holes having diameters less than said ground rule distance in said dielectric layer.

15. The nanocolumnar airbridge structure according to claim 13, wherein said dielectric layer is one of: spin-on organosilicate film, CVD organosilicate film, silicon dioxide, fluorinated silicon dioxide, an organic dielectric, porous versions of any of the preceding materials, or any combinations thereof.

16. The nanocolumnar airbridge structure according to claim 13, wherein said nanometer scale pattern is formed using phase-separated polymers.

17. The nanocolumnar airbridge structure according to claim 13, wherein said nanometer scale pattern is formed using diblock copolymers.

18. The nanocolumnar airbridge structure according to claim 13, wherein said nanometer scale pattern is formed using a lithographic technique.

19. The nanocolumnar airbridge structure according to claim 13, wherein said lithographic technique is selected from the group consisting of: photolithography, electron beam lithography, x-ray lithography, interferometric lithography, extreme-ultra violet lithography, imprint lithography, embossing, and any combinations thereof.

20. The nanocolumnar airbridge structure according to claim 13, wherein said transfer of said nanometer scale pattern results in a dielectric having a nanometer scale pattern of holes or pillars only between the trough lines.

21. The nanocolumnar airbridge structure according to claim 13, wherein said transfer of said nanometer scale pattern results in a dielectric

having a nanometer scale pattern of holes or pillars between the trough lines and under the trough lines.

22. The nanocolumnar airbridge structure according to claim 13, wherein said bridge layer on said nanometer scale patterned dielectric results in the formation of nanometer scale capped voids.

23. The nanocolumnar airbridge structure according to claim 13, wherein said bridge layer comprises a dielectric material.

24. The nanocolumnar airbridge structure according to claim 23, wherein said bridge layer is a multilayered structure comprising a combination of more than one dielectric material.

25. The nanocolumnar airbridge structure according to claim 13, wherein said bridge layer is a dielectric film having a dielectric constant less than 3.5.

26. The nanocolumnar airbridge structure according to claim 9, wherein said voids are vertically oriented.